DOCUMENT RESUME

ED 080 882 CE 000 098

AUTHOR White, Sally
TITLE Physical Criteria for Adult Learning Environments.
INSTITUTION Adult Education Association of U.S.A., Washington, D.C. Commission on Planning Adult Learning Systems, Facilities, and Environments.
PUB DATE Oct 72
NOTE 30p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Adult Education; Adult Learning; Adult Students; *Bibliographies; *Classroom Design; Controlled Environment; Environmental Criteria; Interior Design; *Physical Environment; *Psychological Design Needs

ABSTRACT

The development of learning environments especially for adults has been neglected and research in planning such environments is fragmented and minimal. There is general agreement that facilities for adults should have an aura of adulthood to contribute to an adult's feeling of ease, confidence, and capability; that they should be flexible in room configuration, ability to change the environment, and availability of multi-purpose equipment; and that social and phychological implications of seating arrangements should be considered. Specific findings cover space, fixtures, and furniture; the use of colors and lighting; other visual and auditory factors such as the disruptive quality of clutter and decrements in hearing ability among adults; and recommended temperature, humidity, and air motion. Sources of further information include the Educational Facilities Laboratories, the Kellogg Foundation, business firms which train large numbers of employees, and hotel and motel chains. A 54-item annotated bibliography of books, articles, and reports and a 6-item listing of bibliographies on educational environments supplement the text. (MS)

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PHYSICAL CRITERIA FOR ADULT LEARNING ENVIRONMENTS

Sally White
October, 1972

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OVERVIEW

Adult education has often been treated as the illegitimate child of the American educational system.

Adult learning environments have been formed out of dependency and contingency. If no one else was using a facility (a public school building, for instance), adult education classes could meet there in the evening. If no other meetings of any kind were scheduled, administrative conference rooms could be made available for adult education purposes. If Bingo was Monday night, the Boy Scouts Tuesday evening, and the congregational supper on Friday night adults could use the church hall on Wednesday or Thursday.

While something may be better than nothing, and any place to meet may be better than no place at all, the point is that adult education has a history of dependence upon institutions whose primary focus is not adult learning. Consequently, the development of learning environments especially for adults has been neglected, and research in planning adult learning environments has been fragmented and minimal.

Nonetheless, general estimates indicate that while about seventy-five per cent of learning is accounted for by motivation, meaningfulness, and memory, the remaining twenty-five per cent of learning is dependent upon the effects of the physical environment. In general, therefore, the success of adult education is dependent to a considerable extent upon the facilities and environment provided for the learner.

In addition to what may be termed "adult learning facilities"--the buildings and areas in which learning takes place--there are physiological, psychological, social, and physical dimensions of any milieu in which an adult finds himself; these constitute the "adult learning environment."

It seems clear that adult educators should plan their facilities to emphasize those dimensions most conducive to learning. At this time, however, no comprehensive standards relating even physical environment to effective learning are available.

In an attempt to provide at least a starting point, this study of recent literature has been undertaken to discover if there are any useful physical guidelines for adult learning environments. The annotated Bibliography that is core of this report (pp 16 to 27) consists of 54 principal items plus six bibliographies on educational environments. Some concepts about adult learning environments on which there is general agreement are summarized in the first section (pp 3 to 6). Some specific findings from individual studies are listed in the second section (pp6 to 12). Conclusions and recommendations are listed in the third section (pp 12 to 15).

I CONCEPTS

Aura of Adulthood

The fundamental concept in creating an effective adult learning environment, according to the literature, is that, as much as possible, it is desirable to have an aura of adulthood in the facilities used for adult learning. School is not just for children. This is a basic tenet of adult educators; therefore, it seems reasonable that adult learning facilities should reflect their belief. Adults are often physically uncomfortable in child size furniture, and they are pyschologically uncomfortable in traditional classroom settings which emphasize the distance and inequality between teacher and student. Although adults may attend classes in order to obtain guided instruction in a particular subject, they have their own areas of expertise out of class, and they appreciate being treated as mature people, as their instructors' peers.

Moreover, adults have additional specific physical environmental needs and desires. For example, adult learning facilities should have adequate close-by parking areas. The parking lots should be well lighted, since many adult classes take place at night. Adults often are not able to walk rapidly or far. Planned adult learning facilities should be located on the ground floor close to entrances and parking lots. If this is not feasible, elevators should be available. For older or handicapped adults, ramps should be provided. Also, adults use telephones more than children do. An adult learning center should have accessible phone booths for its patrons.

These may seem like relatively inconsequential matters, but attention to such details contributes to an adult's feeling of ease, confidence, and capability in a learning situation. Formal education, especially credential-oriented studies, can be a trying experience for adults, many of whom are years away from their last formal educational experience. Any way in which such adults can be made

more comfortable will facilitate their transition into a new learning situation.

Much of the limited research on adult learning environments indicates that adults are even more cognizant of their surroundings than children are. If adults are more aware of details in their environments, then attempts to create a pleasant learning situation should always be made, no matter how inconsequential a change may seem. Also there is the fact of adults' decreasing physical abilities (e.g. the common loss of visual acuity) with their increasing years. An educator should attempt to maximize the possibilities for efficient learning by providing a comfortable and flexible and appropriate learning environment for adults.

Flexibility

In general--as reported in the literature--the most favored criterion for adult learning design is the word just mentioned, "flexibility." This includes flexibility in room configuration, ability to change the environment (e.g. by moving furniture), and availability of adaptable or multi-purpose equipment.

Repeatedly, authors emphasize that there are great variations among individuals and groups of adult learners. Individually, especially for study purposes, it is essential that adults should be given an opportunity to choose their surroundings (carrels vs. library tables, for example). While one study of young adults indicated an inverse relationship between the size of a study space and its choice as a study area (Stoke 1960), this preference was not universal, and the importance of choice was reiterated.

Providing flexibility for different groups may involve the use of open areas, adaptable furniture, and mobile equipment (e.g. see DeCrow's 1970 report). The point is that adult learners come together for different purposes, and physical facilities planned specifically for adults should have materials and spaces <u>available</u> for use but not foisted upon students. An example of a lack of flexibility

in learning spaces is the assignment of a class to a lecture hall with immovable chairs positioned on a slanted floor facing a central podium. While conducive to some types of learning, this arrangement is not ideal for a small seminar on human relations, for a knitting class, or for any other interactive or individual activity. This is the type of problem which occurs often when adult learners are forced to use borrowed facilities.

Social and Psychological Dimensions

Favorable social and psychological dimensions in a learning environment should promote more efficient learning. Unfortunately, little literature exists to identify these dimensions. Generally, though: (1) it is desirable that surroundings reflect the intent of the adult education meeting, and (2) adults should have a choice of various learning experiences and environments.

One article on facilities planning mentions the psychological importance of using a room with adequate, not extra, seating spaces. "Unoccupied seats imply a failure to fill them or lack of interest. Participants like to feel they are occupying a room specifically set aside for them, not pushed into a space which happened to be vacant" (Goldman).

A study by Steinzor has indicated social implications of learning environments. He found that, in discussions at round tables, distance and direction were better predictors of verbal interaction than proximity. That is, people opposite each other at a round table interacted more frequently than people seated next to one another.

Abernathy (1940), in a study of young female adults, found that test scores decreased when tests were administered in rooms other than the regular classroom and when the teacher or proctor for a test was different than their regular teachers.

These results indicate that physical factors do influence adult learning. At this time, however, there is a paucity of investigations about these matters.

In addition there is no unified attempt to organize our limited knowledge about the interactions between the physical facets of an adult learning environment and the psychological and social reactions of an adult learner.

II ADULT LEARNING ENVIRONMENTS - SPECIFIC FINDINGS

The general atmosphere of a learning environment is dependent upon numerous physiological, psychological, social, and physical details. Of these, physical details are the most easily studied, and, as a consequence, it is possible to provide some specific suggestions about physical norms for adult learning environments, derived from studies in many fields. Despite the positive nature of these suggestions, they are merely experiential guidelines which need to be adopted to particular situations since, as has been previously indicated, adult learning environments should vary according to the needs, interests, and expectations of individual participants.

Space, Fixtures, and Furniture

1) An adult learning facility--first of all--should have an aura of adulthood about it. Ashtrays for smokers, a refreshment area, coffee machines, and other creature comfort items should be available.

2) Advocates of the use of carpeting especially recommend it for adult facilities because they say it provides a relaxed feeling of warmth and intimacy.

3) At least 30 square feet per student is recommended in seminar rooms. Specifically, a 450 square foot room is needed for 15 students. For a small lecture hall, less space is required: 18 to 22 square feet per student.

4) Moveable walls, multi purpose storage areas, portable blackboards, and easily rearranged tables and chairs are suggested for flexible and adaptable learning spaces.

5) Equipment with multiple uses is envisioned; e.g. mobile screens carrying electrical power which can be written on, projected on, and which divide areas and provide electrical current for other devices.

6) Furniture should be adult size. Suggested working heights for adult equipment are 27 to 29 inches for seated work areas, tables, and desks.

7) Furniture for an adult learning environment should also reflect the learning styles of adults. This is evident even in chair design:

a b

a reflects an alert sitting position. This is common to children's traditional learning environments in which attention to a teacher or work space is often required.

b represents a relaxed seating position such as that used in conference rooms. Such chairs reflect the concerns of adult education whose method is often discussion rather than lectures.

The Visual Environment

1) Color

a) For concentrated mental efforts, cool colors such as green, grey, and blue tend to be physiologically relaxing and conducive to adult learning.

b) The color of classroom walls should not be visually bland (e.g. avoid all-white walls) nor exceedingly distracting (e.g. avoid bright reds).

c) A contrast between background walls and the focus wall (e.g. the front of a traditional style classroom) is useful to call attention to presentations; that is, a deeper and softer color should be used on a front wall.

d) Red-orange is the attention getting color. In studies of light signals, red is most easily identified, then green, yellow and white. While these

colors should not be used for study area walls and ceilings, they should be used for visual teaching materials to capture and focus attention.

e) A yellowing of the eyes' lens occurs with increasing age. After age 35 colors at the blue end of the chromatic spectrum are difficult to distinguish. Therefore, stronger tones should be used for colored presentations, especially when using yellow-blue colors. Ability to distinguish colors at the red-green end of spectrum does not diminish with age.

f) Surrounding blackboard with deep tones rather than light ones reduces contrast and lessens "visual shock".

g) There is a trend toward using light colored chalkboards, and theoretically, when perfected, whiteboards should be ideal.

h) White chalk is more visible than colored chalk.

2) Lighting

a) The light source should be constant.

b) A "valence lighting instalation" (see Architectural Record CXLIX) has been isolated as a most effective classroom illumination method.

c) A semi-direct or direct-indirect lighting system is preferred over an indirect lighting system (which provides comfortable soft light but is often an inefficient light source) and over direct lighting (which efficiently provides light, but often with excessive glare).

d) Transillumination (lighting falling across the visual task rather than at the tasks) causes poor visual presentation of materials. That is, "Forms, typically letters cut out of a background, become blurred when they are transilluminated. Light 'spills' out of the letters and parts blend together" (Carson).

e) Lighting and colors should not distort natural appearances. Color and lighting combinations which change the appearance of skin tones should be avoided.

f) Chromatic lighting should be avoided.

g) Investigation of ultraviolet lighting sources has been suggested because of the beneficial physiological effects of irradiation (Birren, Light, Color, and Environment).

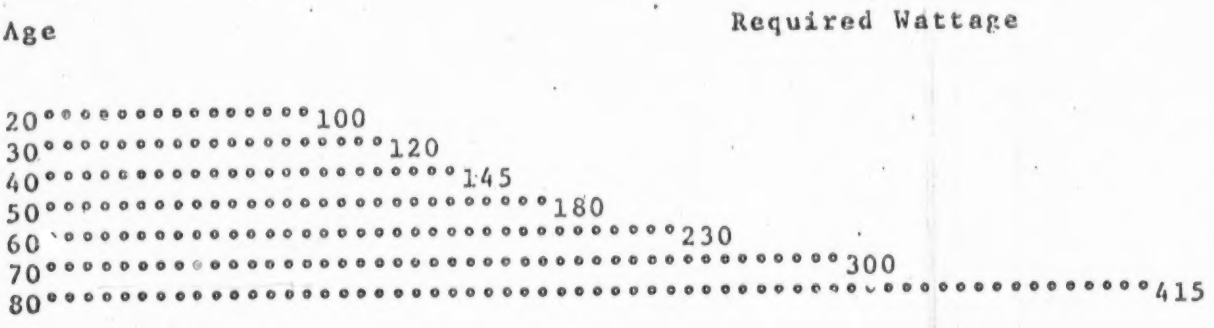
h) Dark ceilings or walls should not be used. Dark surfaces do not reflect adequate light to the learning task.

i) Light colored floors aid in light reflection.

j) Carpeting reflects less light than other floor surfaces. (This means a judgment needs to be made between the value of carpeting for other environmental purposes and the necessity for increasing light reflection.)

k) The brightness or glare factor of materials is a most important element in visual comfort (see Bibliography for books with suggested reflectability and recommended lighting standards).

l) This simple diagram shows age differences in the number of watts needed for visual tasks. It demonstrates the general visual decline with age



(adapted from Verner and Davison)

3) Other Visual Factors

a) Adults take longer to make focus changes (e.g. from a distant object to a close one) than children do. Learners should be given sufficient time to get visually comfortable with new material.

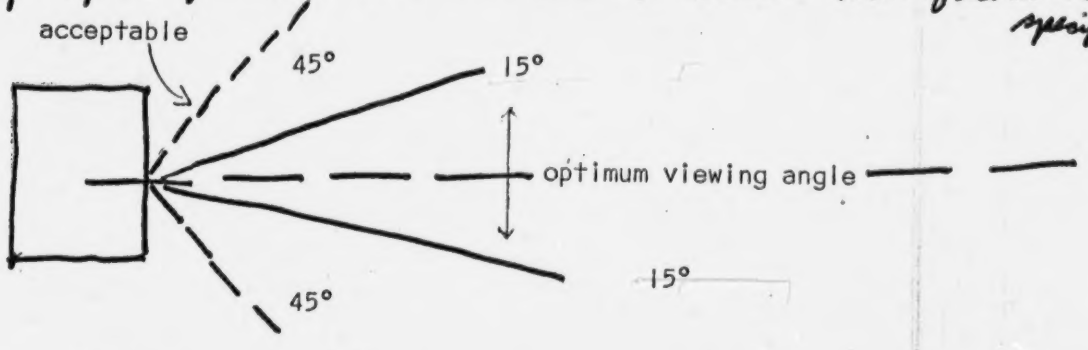
b) Adults often experience increasing visual disability with increasing age. A teacher or lecturer should avoid pacing and other unnecessary movements, as they can create physical discomfort and force the learner to engage in continued, often difficult visual refocusing.

c) Clutter in the visual task can be disruptive. A clean, orderly room invites attention to the learning task. Simple, clear diagrams and carefully selected visual aids containing no extraneous material contribute to effective communication. Chalkboard material should be erased as soon as it is no longer being referred to, and other types of visual presentation should be removed from view so that they will not distract learners.

d) If diagrams are used, they should be large enough to be seen clearly by those farthest away from the chalkboard or screen.

e) Chalkboard words or other visual devices reinforce verbal information.

f) The optimum viewing angle for visual presentations is a 30° range as indicated below. A range up to 90° is acceptable but not advisable. For maximum viewing angles of various visual screens, consult manufacturers' specifications.



g) Low-gloss ink, rather than pencils or ballpoint pens, helps reduce glare. Matte paper may be used in preference to glossy materials.

h) No conclusive evidence regarding the desirability of windows in adult learning environments exists. Windows generally provide illumination, ventilation, and views of the outside. While the physical needs for illumination and ventilation can be supplied by sources other than windows, it is not known whether a view of an outside (or at least a different) area is psychologically

helpful or necessary for an effective adult learning environment.

Auditory Stimuli in Adult Learning Environments

1) A meeting room with no extraneous auditory stimuli would be ideal for a learning environment. Since this rarely exists, educators usually choose environments with the least bothersome noises; e.g., away from street noises.

2) There is a difference between the comfort level and the tolerance level for sounds. Often psychological components make the difference. For example, useful noises like noises from fans, although disagreeable, may be tolerated when quieter but useless noises would be intolerable. Also, noise from a self-controlled device is more acceptable than noise controlled arbitrarily by an outside force.

3) A constant source of interfering noise is preferable to sporadic audible interruptions.

4) High pitched tones are more disturbing than low pitched tones.

5) Carpeting diminishes the noise level in a work area. Similarly, acoustically tiled ceilings and walls can help absorb extraneous sounds.

6) When planning fixed rooms (e.g. lecture halls with nonmoveable chairs) a constant acoustical level is desirable so that the room can be used by various sized groups without altering the auditory situation. A way to eliminate some acoustical difficulties is to use upholstered chairs that absorb the same amount of sound empty as when a person is sitting in the chair.

7) Adults often suffer a decrement in hearing abilities. Therefore, teachers should try to remain relatively stationary so that students do not have to continually readjust to a changing sound source (cf: "Other Visual Factors," 3a; a contending adult value is, of course, the desirability of achieving an atmosphere of informality by casual movement and of maintaining student alertness by frequent changing of visual focus through movement of instructor from one place to another; the point is, of course, that no single guideline is adequate

to the adult situation; environmental judgments need to relate to the total adult learning context.)

8) Adults who consistently speak with higher or lower volume than that used by others often have a hearing problem.

9) An acceptable noise criterion for classrooms is 20 to 30 decibels. This varies with size of area (see Goodfriend for details).

The Thermal Environment

1) Principal components of human thermal comfort are the air temperature, air motion, temperature of surrounding surfaces, and relative humidity. (Various reports on changes in heating and air conditioning systems to promote thermal comfort are contained in the Bibliography.)

2) One guide for thermal factors in sedentary activity spaces recommends a) a temperature from 70° to 72° F., b) 30% to 70% relative humidity, and c) air motion of 12 to 25 feet per minute when using heating or air conditioning systems, or 100 feet per minute for ventilation periods during warm weather (Berlowitz et al.)

3) Age and sex differences compound attempts to quantify thermal norms. ~~Females typically require a higher temperature than males.~~ The norm for adults' thermal environment is higher than that for children's learning environment and also tends to increase with age. Also, the desirable temperature varies with the number of people in a group and the type and amount of activity.

4) Air conditioning is generally accepted as a useful tool to promote physical comfort in adult learning environments.

I I RECOMMENDATIONS AND CONCLUSIONS

For readers interested in learning more about the state of the art in planning environments conducive to adult education, four information sources may be useful.

1) First, look to Educational Facilities Laboratories for information on adult learning environments. Educational Facilities Laboratories (EFL) is a Ford Foundation - ~~funded company~~ organization which supports research about all types of physical facilities

for all education levels. Established in 1958, EFL has spent more than 17.5 million dollars to support and publicize the results of research about physical facilities.

Presently EFL is moving in many directions to bring about more efficient utilization of educational facilities. Excerpted from "The Purpose and Activities of Educational Facilities Laboratories, 1972" brochure, EFL's general concerns include:

a) The recycling of existing space for educational use.

b) Joint occupancy and joint funding (to develop community center schools for all ages).

c) Encapsulated space (low cost "buildings" consisting of air area surrounded by translucent membranes).

d) Systems building and building systems.

e) Instructional technology.

f) Finding facilities in a period when money is tight.

The results of EFL's work is evident in recent school design and remodeling. EFL, for example, has done much to publicize the concept of flexibility in the classroom (A number of EFL reports are included in the Bibliography).

For general information on recent research, readers are directed to:

School Environments Research 1: Environmental Abstracts

School Environments Research 2: Environmental Evaluations

School Environments Research 3: Environmental Analysis

2) A second source of materials is the Kellogg Foundation. The Kellogg Foundation has contributed much to the development of adult learning environments by funding projects for adult residential learning centers in collaboration with several large universities across the country. Alford's book, presents the general concepts used in the planning of these centers and indicates where more information is available.

3) A third source of information about the design of adult learning environments is business and industry. Large firms are constantly involved in training new employees and updating the skills of their workers to accommodate new trade developments. Various training magazines are geared specifically to the problems of business and industry. Adult educators can often apply the facilities recommendations made in these journals and magazines to other adult learning environments.

4) A final relatively untapped resource recommended for educators involved in the planning of adult learning environments is large hotel and motel chains. These establishments cater to the needs of their customers, often businessmen in need of conference rooms. No comprehensive information is available about the standards hotels and motels use in planning meeting rooms; nevertheless, a few articles about various facets of such planning do exist in publications like Training in Business and Industry, and personal contact might be useful in eliciting criteria used by motels and hotels when they set aside areas for training meetings and conference sessions.

As is evident from this survey, information about how adult learning environments should be organized in order to increase learning efficiency is sparse, scattered, and relatively superficial. Fortunately, however, a few agencies and disciplines are presently involved in attempts to isolate the most favorable conditions for adult learning; and adult educators, themselves, are consistently seeking ways to make adult learning more effective.

This, at least, seems certain: surroundings do affect the way a student attends to his learning task. If, as previously mentioned, the physical environment can affect or account for as much as twenty-five percent of learning, then adult educators are well advised to evaluate the facilities currently in use.

Generally, adult education environments happen; details are not planned. However, while some of the findings and recommendations included in this report are impossible to implement when using borrowed facilities or when financially

handicapped, others could be slipped into an existing environment with minimal difficulty; moreover, since physical conditions do affect the comfort and work of the adult learner, it is hoped that the future will see increased research in the area of adult learning environments and increased adoption of concepts and knowledge already available.

Alford, Harold J.

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1. CONTINUING EDUCATION IN ACTION; RESIDENTIAL CENTERS FOR LIFELONG LEARNING. New York: John Wiley & Sons Inc., 1968.

This book presents the essential concepts behind the planning of the continuing education residential centers financed by the Kellogg Foundation at various United States universities.

2. SCHOOLS FOR AMERICA. Report by the American Association of School Administrators. Washington: American Association of School Administrators, 1967.

A futuristic scope characterizes this book on educational facilities. Much emphasis is placed on the challenge of providing flexivility for schools. Sections on community junior colleges and on the advantages and disadvantages of remodeling old style schools should be helpful to planners of adult education environments.

3. GOOD FOOTCANDLES FOR BETTER QUALITY LIGHTING. Report in Architectural Record, CXLIX, (January 1971), 129-32.

This article provides some effective answers to the problem of lighting in a school environment. It presents general guidelines and also pictures of the best and worst lighted classrooms found in a comprehensive study of classroom lighting.

4. REVIEW OF EDUCATIONAL RESEARCH. American Educational Research Association. Washington: American Educational Research Association, June 1965.

This issue is devoted to adult education. Among the papers presented is one about the "group as a sociopsychological setting for learning". Unfortunately this only serves to highlight the paucity of research available on the effects of a group's size, seating arrangement etc. on the learning process.

5. ARCHITECTURE FOR ADULT EDUCATION: A GRAPHIC GUIDE FOR THOSE WHO ARE PLANNING PHYSICAL FACILITIES FOR ADULT EDUCATION. Becker, John W. Washington: Adult Education Association of the United States. (Monograph.) ERIC document ED 018 942.

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Many illustrations of school buildings are included in this guide to designing adult education facilities.

6. THERMAL ENVIRONMENT OF EDUCATIONAL FACILITIES. Berlowitz, M.; Drucker, E.; & Scarbrough, Wm. New York: Division of Educational Facilities Planning, New York State Education Department, 1969.

7. FUNCTIONAL COLOR IN THE SCHOOLROOM. An article in the Magazine of Art, April 1949, pp. 136-38.

8. LIGHT, COLOR AND ENVIRONMENT. Birren, Faber. New York: Van Nostrand Reinhold Company, 1969.

   This book deals practically with the biological and psychological implications of light and color in the human environment. A special section on school color is included. This short comprehensive study also mentions recommended lighting standards for various areas.

9. THE AGREEABLE ENVIRONMENT. Birren, Faber and Logan, Henry L. An article in Progressive Architecture, XLI, (August 1960), 174-77.

10. HOW TO KEEP DOWN NOISE LEVELS IN COMPUTER FACILITIES. Boyer, L.L. An Article in Architectural Record, May 1969, 165-66.

    Computer centers with their air conditioning units and noisy machines are work areas in need of noise reduction. This concise article points out methods of reducing the noise level which can be used in classrooms, especially those vocational training units with machinery and noisy air conditioned areas.

11. WHAT SCHOOL FURNITURE WILL LOOK LIKE TOMORROW. Burr, Donald. Paper delivered before the American Association of School Administrators Annual Convention. Washington: American Association of School Administrators, 1971.

    This address by an architect uses some of the current humanizing and individualizing approaches to education to predict changes in the furniture of educational settings.

12. THE FUNCTION OF ARCHITECTURE IN HIGHER EDUCATION. Brubaker, William. From the proceedings of the 1960 Planning and Utilization of Instructional Facilities Conference, Herbert Hengst (Ed). Ann Arbor: Michigan State University, 1960.

This is a general address about physical considerations of architecture for education (e.g. space between buildings, flexible buildings).

13. SCHOOL BUILDING RESEARCH PUBLICATION NO. 1008. Building Research Institute 1962 Conference Report. Washington: Building Research Institute, 1963.

The report of this conference seves to highlight some of the difficulties met in planning for schools . The paucity of research about building schools is noted and results of some studies are given. Flexibility and adaptability are again chosen as the important facets of school design.

14. TWENTY-FOUR GROUP METHODS AND TECHNIQUES OF ADULT EDUCATION. Carpenter, Wm. Tallahassee: Florida State University, October 1967. (Monograph.) ERIC document ED 024 882.

Twenty-four methods of group interaction in the classroom are defined and described. Physical requirements for each method are described and illustrated. Some methods mentioned are demonstration, buzz groups, role playing, colloquy, workshop, field trip.

15. CREATIVE PLANNING OF EDUCATIONAL FACILITIES. Castaldi, Basil. Chicago: Rand McNally & Company, 1969.

This book sums up many basic ideas and requirements of school architecture. While not exclusively aimed at adult dducators, it utilizes many tenets of educational psychology which are applicable to adults. In addition, it includes a section on college and university planning which offers specific guidelines for the four types of adult classrooms: seminar rooms small lecture halls, large lecture halls and specialized work spaces. Include also are lighting, heating, acoustical and visual recommendations for educational environments. Written recently, this book offers a comprehensive and relevant introduction to the problems of designing an environment conducive to learning and creativity.

16. TOWARD BETTER SCHOOL DESIGN. Caudill, William W. New York: F.W.Dodge Corporation, 1954.

    Although this book is dated in some areas, it provides many guidelines for educational facilities. One good feature is the listing of case studied problems in school design.

17. STUDENT REACTIONS TO STUDY FACILITIES. The Committee for New College, Stuart M. Stoke, chairman. Amherst, Massachusetts: The Committee for New College, 1960. (Monograph.) ERIC document ED 013 535.

    This reports results of a study to determine the physical study facilities preferences by college students. "The most significant finding of all is that for most students, use and approval of study space vary inversely with size" of study area.

18. WHAT WENT WRONG? Council of Educational of Educational Facility Planners. Columbus, Ohio: Council of Educational Facility Planners, 1968.

    This is a catalogue of errors to be avoided in planning educational facilities.

19. ANTHROPOMETRICS FOR DESIGNERS. Cromey, John. London: B.T.Batsford Ltd; New York: Van Nostrand Reinhold Company, 1971.

    This book offers a good analysis of seating design for adults in addition to adult anatomy facts.

20. MATERIALS AND STRUCTURAL DESIGN. Davis, J. Clark. Paper for a seminar on vocational-technical schools, June 1967. (Monograph.) ERIC document ED 016 112.

    This report from a national conference on vocational-technical facilities presents information about a new open center in Southern Nevada. The "Thermal Environments" address may be of special interest.

21. FACTS ON SIGHT AND HEARING IN TRAINING ADULTS. Dickinson, Gary. An article in Training in Business and Industry, VI, No. 10 (October 1969), 56-57.

    Since adults normally suffer visual and hearing decrements

with increasing age, this article suggests ways to increase adults' sight and sound capacities in a training situation.

22. THE MEASURE OF MAN HUMAN FACTORS IN DESIGN. Dreyfuss, Henry. New York: Whitney Library of Design, 1959.

This provides anthropometric data on the adult male and female with many illustrations and a few words about the criteria to which furniture and products must conform in order to be accepted as useful and comfortable by the human adult. In graphic detail Dreyfuss presents some problems of design for humans; his emphasis here is on the work space.

23. AIR CONDITIONING FOR SCHOOLS. Educational Facilities Laboratories. New York: Educational Facilities Laboratories, March 1971.

This publication favors the use of air conditioned facilities in schools and argues for it.

24. GUIDELINES FOR PREPARING EDUCATIONAL SPECIFICATIONS FOR AGRICULTURAL EDUCATION. Florida State Department of Education Bulletin 72H-4. Tallahassee: Florida State Department of Education, May 1968. (Monograph,) ERIC document ED 042 875.

These guidelines fashioned for high school and post high school settings provide detailed instructions encompassing the various considerations of agricultural education. They are an example of the type of work that remains to be done in other areas of adult education.

25. THE USE OF CARPET IN COLLEGE AND UNIVERSITY BUILDINGS. Garrett, Joe B. Los Angeles: California University; New York: American Carpet Institute, December 1965. (Monograph.) ERIC document ED 018 068.

This article mentions some of the advantages noted in the use of carpeting in school facilities. Briefly these include 1) acoustical advantages;
2) economy in maintenance and also because ceilings do not have to be acoustically tiled to absorb as much sound;
3) carpets reflect less light than other floor surfaces;
4) more "civilized" conduct is reported among students, also a psychological feeling of warmth.

26. PROTOTYPES FOR LOW-COST SCHOOLS. Goble, Emerson (Ed). A report in Architectural Record, CVII (April 1950), 125-59.

These articles on designing low cost schools may be of general interest to those involved in school building and planning. Several cost-reducing ideas are mentioned e.g. economical heating and ventilation solutions, varying placement of classrooms, which may be incorporated into adult education environments. However, these articles are concerned mainly with schools for children.

27. THERE'S MORE THAN ONE WAY TO CUT A CLASSROOM. Goldman, Jordan. An article in Training in Business and Industry, VI, No.3, (March 1969), 38-9.

This article suggests various methods of arranging furniture and classrooms for training sessions. The psychological impacts of a few seating situations are considered.

28. SOUND OR FURY MAN'S RESPONSES TO NOISE. Goodfriend, Lewis S. An Article in Architectural and Engineering News, VII, (April 1965), 42-5.

This article mentions a number of the physical and psychological dimensions which determine the tolerance levels of various sounds.

29. SITTING POSTURE. Grandjean, E. (Ed). Proceedings from a symposium at Zurich in 1968. London: Taylor and Francis,Ltd., 1969.

This book of readings, six of which are in English, gives the results of recent research in the area of ergonomic chair design. One reading deals specifically with chairs in the educational environment. Other articles deal specifically with adults, their sizes and needs.

30. ENVIRONMENT FOR LEARNING - THE 1970's. Green. Allen C. Report of the ERIC Clearinghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, March 1969. (Monograph.) ERIC document ED 029 461.

This keynote address to a 1968 Environment for Learning conference is a good introduction to the physical changes in educational facilities that have been initiated in the late 1960's and recent 1970's, It shows the trend toward flexibility that has begun to develop throughout the field of education in general and in particular, in

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building and classroom design.

31. EDUCATIONAL CHANGE AND ARCHITECTURAL CONSEQUENCES. Gross, Ronald. A report to the Educational Facilities Laboratories. New York: Educational Facilities Laboratories, 1968.

Flexibility in educational facilities design is emphasize in this report. The five types of learning which should be possible in school environments are enumerated as 1) conventional class learning; 2) independent study; 3) dialogue; 4) seminar; and 5) presentation situations. The illustrations and design concepts presented here for pre-primary, primary, middle and secondary schools are models of the type of research that is needed in the area of adult education.

32. THE PLANNING AND UTILIZATION OF INSTRUCTIONAL FACILITIES. Proceedings of an invitational conference sponsered by the Center for the Study of Higher Education, Michigan State University. Herbert Hengst (Ed). New York: Educational Facilities Laboratories, 1960. ERIC document ED 023 255.

These addresses at the 1960 conference indicate some of the considerations necessary in planning facilities for higher education. Bibliography included.

33. PLANNING FOR AV. Hinkley, J. and Mitchusson, E. An article in Training in Business and Industry, V, No. 10, 29-35.

In this article the design of an Allis-Chalmers training center is reviewed. This center emphasizes audio-visual presentation and the article is geared accordingly.

34. IES GUIDE FOR SCHOOL LIGHTING. Illuminating Engineering Society. New York: Illuminating Engineering Society, June.1962.

35. GUIDELINES FOR ESTABLISHING AND OPERATING AN ADULT LEARNING LABORATORY. Lane, Cleve and Lewis, Robert. Raleigh, North Carolina: School of Education, North Carolina State University, 1971. (Monograph.) ERIC document ED 052 436.

Plans for physical facilities for adult learning are included in this report on a program which attempts to blend adult learning theory with an individualized

36. RADIANT CEILINGS. La Vanture, Alonzo A. 1971 Address to American Association of School Administrators Convention. Washington: American Association of School Administrators, 1971. ERIC document ED 049 540.

    This speech explains the use of radiant ceilings in both heating and air conditioning systems.

37. SCHOOLS FOR NEW NEEDS. Lopez, Frank G. (Ed). New York: F.W. Dodge Corporation, 1956.

    This book gives examples of good educational design. Many illustrations.

38. SENSORY FACTORS IN THE SCHOOL LEARNING ENVIRONMENT . WHAT RESEARCH SAYS TO THE TEACHER. McVey, G.F. A National Education Association Report, Series No. 35. Washington: National Education Association, 1971. (Monograph.) ERIC document ED 060 507.

    This article offers a comprehensive introduction to the study of the effects of physical environments upon students. It considers visual, acoustical, thermal aspects of environment as well as furniture design and arrangement. In addition, practical recommendations are included e.g. comfortable norms for viewing displays.

39. SCHOOL ENVIRONMENTS RESEARCH NO.1: ENVIRONMENTAL ABSTRACTS. An Educational Facilities Laboratories Report. Ann Arbor: University of Michigan, 1965.

    This book sponsered by Ford funded EFL is a collection of annotated abstracts in the following general areas: Environment and the Human Senses, Behavior and the Atmospheric Environment, Behavior and the Luminous Environment, Behavior and the Sonic Environment, and Behavior and the Social Environment. It is a quite comprehensive report of research in these areas until 1965 and it is arranged with long abstracts so that recourse to the original reports is not necessary in order to evaluate research findings.

40. SCHOOL ENVIRONMENTS RESEARCH NO. 2: ENVIRONMENTAL EVALUATIONS. An Educational Facilities Laboratories Report. Ann Arbor: University of Michigan, 1965.

    This book presents reports about the effects of space, temperature, light, sound, and social environment upon man.

41. SCHOOL ENVIRONMENTS RESEARCH NO. 3: ENVIRONMENTAL ANALYSIS. An Educational Facilities Laboratories Report. Ann Arbor: University of Michigan, 1965.

This project report outlines a method of investigating environmental relationships in human learning.

42. PLANNING FACILITIES TO ACCOMMODATE ADULT EDUCATION. Report to New York State Department of Education Division of School Buildings and Grounds. Albany, New York: State University of New York, 1958. (Monograph.) ERIC document ED 036 982.

This bulletin distributed by the New York State Department of Education mainly deals with considerations when using children's school facilities for adult learning. This is an extremely helpful booklet with practical suggestions for the practitioner, e.g. models of adequate storage areas for adults' equipment are suggested. Equipment and space utilization are seen as the keys to successful adaptation.

43. WORK PLACE FOR LEARNING. Perkins, Lawrence B. New York: Reinhold Publishing Corporation, 1957.

This work was commissioned by the Libbey Owens Ford Glass Company and thus emphasizes the use of windows in school environments. It is aimed primarily at educational facilities for young children but does contain some general architectural concepts for any level of school planning.

44. PROGRESSIVE ARCHITECTURE LII, (February 1971).

This issue is devoted to schools. Included are a number of illustrations of different educational environments. The trend is toward flexible life spaces in classrooms, that is, toward rooms which allow the student to choose and model the environment. Among the topics covered in this magazine are methods of enclosing and opening classroom space and moveable furniture designs for students. In summary, these articles offer proof that architects are attempting to keep pace with changing teaching methods.

45. A MANUAL FOR EVALUATING SCHOOL FACILITIES. Reida, G.W. A manual issued by Kansa State Department of Public Instruction. Topeka: Kansas State, 1972.

This is a general checklist for use in rating and planning

educational facilities. Guidelines are suggested for primary and secondary schools. However, the sections on heating, ventilation, air conditioning, and lighting are especially informative. In addition, classroom guidelines for specialized instruction e.g. business education and industrial arts may be of interest to respective adult educators.

46. CAMPUS CONTINUING EDUCATION CENTER, OUTLINE PROGRAM. Schram, Lloyd et.al. Seattle: Washington University, March 1966. ERIC document ED 010 674.

This is the report of an ad hoc planning committee for a campus continuing education center at the University of Washington. Necessary rooms are listed and briefly described.

47. GUIDELINES FOR ABE LEARNING CENTERS. Souriman, Vivian (Ed). An Adult and Continuing Education project report. Washington" United States Office of Education, June 1970.

A small section of this report (pp. 11-15) contains recommendations for a learning center for adult basic education.

48. CRISIS IN PLANNING. Theodores, James L. Columbus, Ohio: Council of Educational Facility Planners, 1968. (Monograph.) ERIC document ED 026 844.

This book calls for focused planning of educational facilities rather than the much too normal "happening" of new buildings.

49. THERMAL ENVIRONMENT FOR CLASSROOMS, CENTRAL SYSTEM APPROACH TO AIR CONDITIONING. Triechler, Walter W. A paper delivered to the American Association of School Administrators 1971 Convention. Washington: American Association of School Administrators, 1971.

50. ENVIRONMENTAL ENGINEERING FOR THE SCHOOL, A MANUAL OF RECOMMENDED PRACTICE. United States Public Health Service Bulletin No. 856. Washington: United States Public Health Service, May 1962.

This short book on school planning includes sections on acoustics and lighting which may be of use. It does contain checklists for these and other areas of facilities planning.

51. THE WINDOWLESS SCHOOL: SOME BIOLOGICAL AND ECONOMICAL CONSIDERATIONS. VandenHazel, B.J. 1970 . ERIC document ED 057 452.

This paper attempts to isolate the effects of windowless classrooms upon students by examining psychologican and physiological aspects as well as economic and safety features of windowless areas. On the whole, windowless classrooms are not advised. Bibliography included.

52. NOT ONLY PARTITIONS, NOT ONLY FURNITURE. Vaughan, James. An article in Interiors, September 1969, pp. 148-151.

This as an article about non-rectangular grid, non floor-to-ceiling wall defined office work spaces. A number of companies' attempts to provide mobile, non-box office work areas are presented.

53. PHYSIOLOGICAL FACTORS IN ADULT LEARNING AND INSTRUCTION. Verner, Coolie and Davison, Catherine. Report for Research to Practice Series, the Florida State University Processing Center, Department of Adult Education. Tallahassee: Florida State University, October, 1971.

This report presents facts about the physiological changes occurring with increasing age and suggests ways educators can circumvent the deleterious effects of age.

54. ARCHITECTURE AND THE INTERIOR ENVIRONMENT. Wright, Henry. An article in Architectural and Engineering News, VII, (April 1965, 24-33.

This architect's address to his peers suggests programmed temperature control within buildings in order to allow for changes in room use. For example, he notes women normally need warmer temperatures than men.

ADDITIONAL BIBLIOGRAPHIES ABOUT EDUCATIONAL ENVIRONMENTS

1. THE LUMINOUS ENVIRONMENT OF THE CLASSROOM: A SELECTED AND ANNOTATED BIBLIOGRAPHY. Hartman, Michael. A report sponsered by theOffice of Education for the ERIC Clearinghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, 1968. ERIC document ED 024 250.

2. PLANNING IN HIGHER EDUCATION: AN INTERPRETIVE BIBLIOGRAPHY PART I: FACILITIES AND SPACE UTILIZATION. Isler, Norman. ERIC Clearninghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, November 1969. ERIC document ED 032 743.

3. PLANNING IN HIGHER EDUCATION: AND INTERPRETIVE BIBLIOGRAPHY PART II CAMPUS PLANNING. Isler, Norman. ERIC Clearinghous on Educational Facilities. Madison, Wisconsin: Wisconsin University, November 1969. ERIC document ED 032 744.

4. THERMAL ENVIRONMENT IN SCHOOL FACILITIES. A SELECTED AND ANNOTATED BIBLIOGRAPHY. Hartman, Robert R. ERIC Clearinghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, 1968.

5. SYSTEMATIC METHODS IN SCHOOL PLANNING AND DESIGN, A SELECTED AND ANNOTATED BIBLIOGRAPHY, Murtha, D.M. ERIC Clearinghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, 1968. ERIC document ED 024 251.

6. EDUCATIONAL FACILITIES LITERATURE 1968: A BIBLIOGRAPHIC REVIEW. Wakefield, Howard and Bloomfield, Byron. ERIC Clearinghouse on Educational Facilities. Madison, Wisconsin: Wisconsin University, September 1969. ERIC document ED 032 742.

   This quite comprehensive bibliography for 1968 may be especially helpful for those interested in physical standards for planning and in maintenance and financial considerations. The bibliography of case studies is exceptional and should contain at least one informative entry for any special interest you might have.

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